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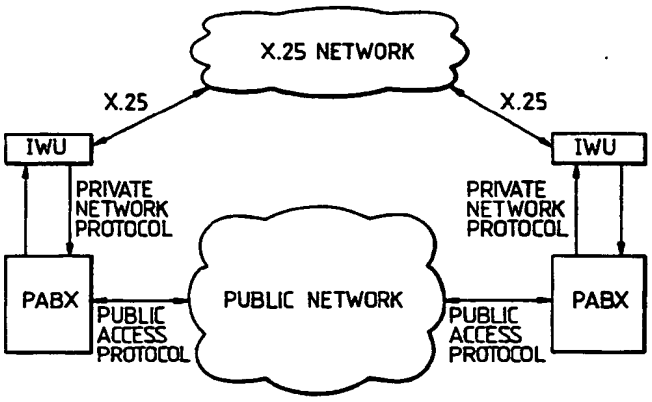
(54) Title: SPEECH/SIGNALLING OVERLAY



(57) Abstract

Where private networks (PABX) are required to be connected together this can be carried out by separation of the signalling and transmission network bearers and using the public network. An interworking unit is used to provide the necessary protocol changes between the private (PABX) and public networks. The signalling can be sent by services such as X.25 packet switching or using the features of an Intelligent Network.

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SPEECH/SIGNALLING OVERLAY

The present invention relates to the provision of interconnections between private networks using the facilities of public networks.

The development of private networks is moving forward rapidly. In highly developed countries (such as the UK), dedicated private networks are now commonplace, linking together the relatively large sites of a particular business.

In the UK, the next development is towards the "Integrated Scenario" where the public network co-operates with the private network signalling protocols to provide "Virtual Private Circuits" with channels in a 2048kbit/sec bearer switched to different locations based upon the signalling information.

Other countries have not been so liberal with the use of dedicated private circuits and networks have not evolved in the same way and the public network operator sees less benefit in co-operating with the private networks.

In these countries, an alternative strategy is developing known as the "Overlay Scenario". In this case, the PABX takes on the responsibility for establishing the connections across the pubic network based upon the routing information and, because the public network is not capable of supporting the full range of signalling required to provide the private network services, signalling for the services takes place directly between the PABXs across some other

network.

To achieve this with existing PABXs with their dedicated protocols would require a significant change to the signalling protocols and call establishment logic.

An alternative approach is to provide an "Overlay Scenario Interworking Unit". The purpose of this unit would be to "fool" the PBX into thinking that it was permanently connected to dedicated private circuits, whilst dynamically establishing the connections across the public network as they were required.

According to the present invention there is provided a method of providing system and network independent dedicated private circuit telecommunications functionality using separate signalling and transmission network bearers.

There is further provided a private telecommunications network including an interworking unit for use in interconnecting network to a further private network via a public network using separate signalling and transmission network bearers, the interworking unit comprising an encoder to take the information from the outgoing user side and encode it so that the transmission and signalling information can be carried across separate network and signalling bearers to be decoded at the further private network and a decoder to take incoming transmission and signalling information and using information provided by an encoder correlate the transmission bearers and the signalling information at the interface on the incoming user side.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which :-

Figure 1 shows a diagrammatic view of an interconnection between two private networks via a public network using the present invention;

Figure 2 shows the use of the present invention in conjunction with an intelligent network;

Figure 3 shows a flow chart of the call set up procedure using an intelligent network as shown in Figure 2;

Figure 4 shows a diagrammatic representation of the use of the present invention in international communications;

Figure 5 shows a diagrammatic view of the functioning of an Interworking Unit in accordance with the present invention.

There are a number of options as to how an interworking unit may be achieved, but Figure 1 shows one possibility.

The interworking unit (IWU) sits alongside the PABX, providing a virtual network to the PABX. All private network calls route through the IWU which uses a database to translate the incoming Private network number to a public network number and establishes an outgoing call to that public network address across another private interface.

This is routed back through the PABX so that the public network interfaces that are required on the PABX can be used, simplifying the development of the IWU. The address provided on the secondary call identifies the call, but need not route the call to the final extension across the public network.

The signalling necessary to establish the final part of the call on the other side of the network is sent through the overlay network, the suggestion in this case is that the signalling should be X.25 and calls established within the X.25 network as required to support the private network.

Because the IWU is connected only to a single PABX, the signalling between the IWU and the PABX is a single protocol. Where different protocols are used on the originating and terminating PABXs, protocol conversion will be required.

This IWU can be seen as the first of a family of products:-

1. Simple DPNSS - DPNSS across the network;
2. Simple CorNet-N - CorNet-N across the network;
3. CorNet-N - DPNSS Interworking across the network;
4. CorNet-N or DPNSS - QSIG across the network;
5. Speech compression allowing multiple connections to be made through one bearer across the network;
6. Dynamic establishment of the signalling bearer to cost reduce the calls;

Other unrelated functions may also be able to be added to

the IWU in the future.

Using X.25 as the protocol between the networks means that all existing public networks can be accessed, all that has to be managed is the relationship between the calling and called sides of the connection across the network to ensure that security is maintained.

Initially, it can be expected that the IWU will manage the virtual network database, but there is no reason why other databases should not be used.

This example has several benefits:-

1. It builds upon strengths in networking;
2. It is not "core product" in that it is an external add-on to any product;

The solution is not "the cheapest" for the customer in that it requires him to have additional private network interfaces and generates additional traffic within the gateway PABXs. However, if it proves successful, the logic could be incorporated into the core product in the future.

In Figure 2 is shown the situation where the signalling is routed via the Service Control Point (SCP) of an Intelligent Network. This enables access to services which may be provided by the Intelligent Network, one or more PBX's being connected to a gateway PBX for the network.

Figure 3 shows the flow diagram for the establishment of a call using an Intelligent Network. The abbreviations used are :-

SETUP DN	-	Setup Dialled Number
REQ TR	-	Request Transmission
RES NDN	-	Reserve Network Dialling Number
SETUP IDN	-	Setup Incoming Dialling Number
EST AP-AP DIALOG	-	Establish Application-Application Dialog
CALL INF	-	Call Information

Figure 4 shows the use of the invention including the use of Intelligent Networks, SYS X being the protocol used in the UK and EWSD the protocol used in USA and Germany.

Figure 5 shows the construction of an Interworking Unit (IWU) for use with the invention.

A prime function of the IWU is to convert the signalling protocols between the originating PBX and the terminting PBX based upon information held within the database. The following conversions are needed:

1. Conversion between the PBX to IWU protocol and the Network Access protocol;
2. Conversion between the Network Access protocol and the IWU to PBX protocol;
3. Conversion between the PBX to IWU protocol and the IWU to IWU protocol;
4. Conversion between the IWU to IWU protocol and the IWU to PBX protocol.

The PBX to IWU and IWU to PBX protocols are a choice from CorNet-N, DPNSS, QSIG (or the ISO equivalent), but other protocols can be accommodated within the concept.

Within the IWU the follow functions are carried out:-

The Encoder Function takes the information from the outgoing user side and encodes it so that the transmission and signalling can be carried across separate networks and decoded;

The Decoder Function takes incoming independent transmission and signalling information and, using information provided by the Encoder correlates the transmission bearers and the signalling information at the interface on the incoming user side;

The Splitter separates the signalling and transmission

paths at the incoming user side;

The Compressor compresses the information from a number of user side transmission bearers onto a single network side transmission channel if appropriate;

The Router takes the address information in the User Side signalling and generates the Network Side address to be used in the transmission network by examining database information;

The Outgoing Correlator adds unambiguous information to the Network Sidesignalling so that the user side signalling can be identified at the destination;

The Outgoing Network Interface Originates the Network Side and adds dialing functions to address the destination IWU and switches the bearers from the compressor to free network bearers;

The Outgoing Signalling Interface connects the Network Side signalling to the network for the destination IWU;

The Incoming Network Interface Terminates the Network side and flags the source to the incoming correlator;

The Incoming Signalling Interface terminates the signalling network and provides the information to the incoming correlator and the combination processor;

The Incoming Correlator identifies the signalling information and incoming transmission bearer and links them together;

The Expander extracts the informaton from the network side transmission bearer and generates a number of user side

transmission bearers if appropriate and identifies the information to the Incoming Correlator;

The Combination processor takes the incoming transmission connection from the Expander Interface and combines it with the correlated signalling from the incoming signalling interface;

The User Side Addresser takes the address information from the Combination Processor to provide the incoming user address.

CLAIMS

1. A method of providing system and network independent dedicated private circuit telecommunications functionality using separate signalling and transmission network bearers.

2. A method as claimed in Claim 1 further including the use of a data base to determine the routing across intervening switched and fixed networks to provide private network capabilities.

3. A method as claimed in Claim 1 or 2, further including the compression of the user information before transmission.

4. A method as claimed in Claim 1, 2 or 3 wherein the signalling network bearer is part of an X.25 packet switching network.

5. A private telecommunications network including an interworking unit for use in interconnecting the network to a further private network via a public network using separate signalling and transmission network bearers, the interworking unit comprising an encoder to take the information from the outgoing user side and encode it so that the transmission and signalling information can be carried across separate network and signalling bearers to be decoded at the further private network and a decoder to take incoming transmission and signalling information and using information provided by an encoder correlate the transmission bearers and the signalling information at the interface on the incoming user side.

6. A network as claimed in Claim 5, the encoder comprising a router to take the address information in the user side signalling and generate therefrom using information contained within a database a network side address to be used in the transmission network.

7. A network as claimed in Claim 6, the decoder comprising a correlator to add unambiguous information to the network side signalling so that the user side signalling can be identified at the destination.

8. A network as claimed in Claim 5, 6 or 7 the encoder further comprising a compressor and the decoder further comprising an expander.

Fig.1.

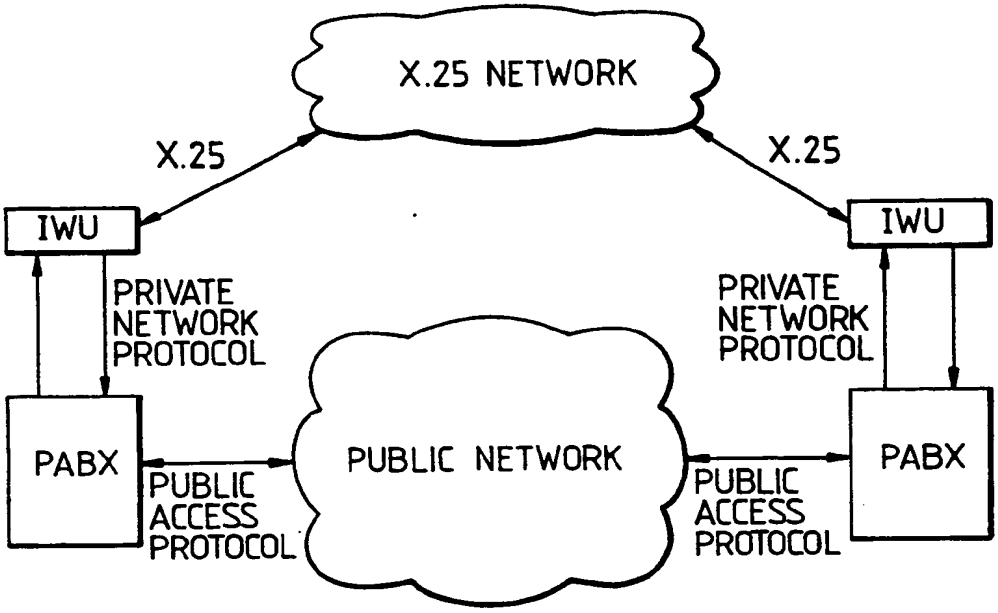
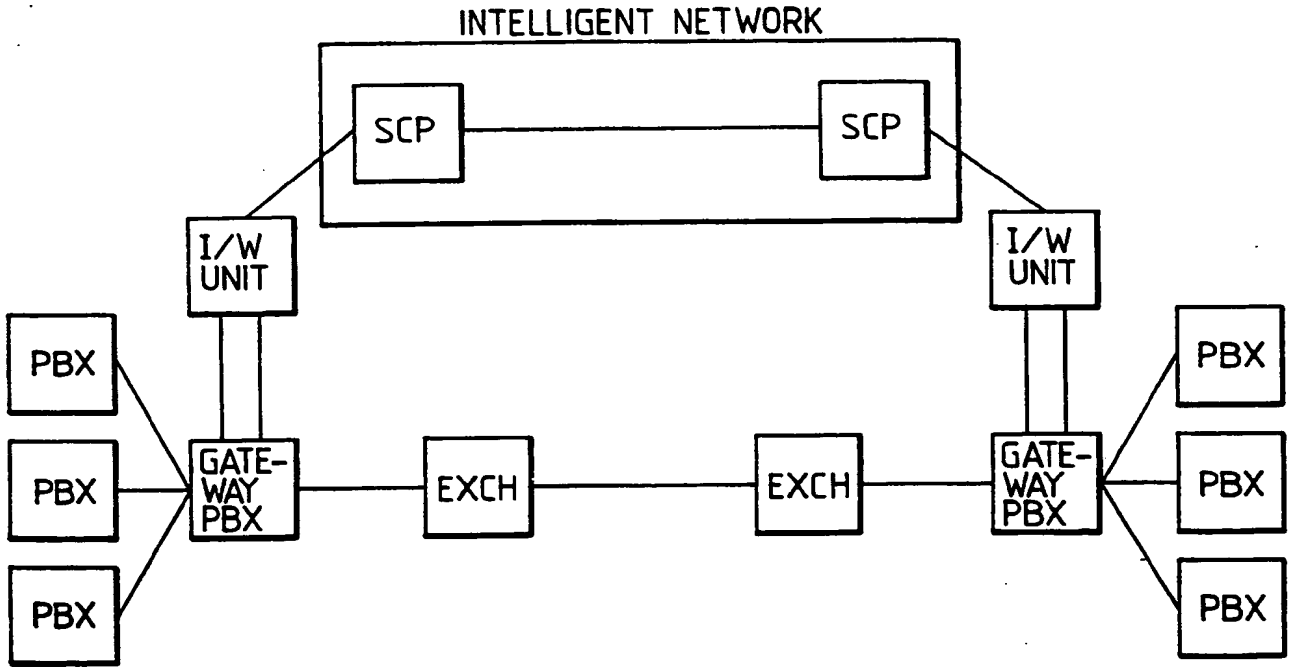

X.25 NETWORK
X.25
X.25
IWU
IWU
PRIVATE NETWORK PROTOCOL
PRIVATE NETWORK PROTOCOL
PABX
PUBLIC NETWORK
PABX
PUBLIC ACCESS PROTOCOL
PUBLIC ACCESS PROTOCOL

Fig.2.


INTELLIGENT NETWORK
SCP
SCP
I/W UNIT
I/W UNIT
PBX
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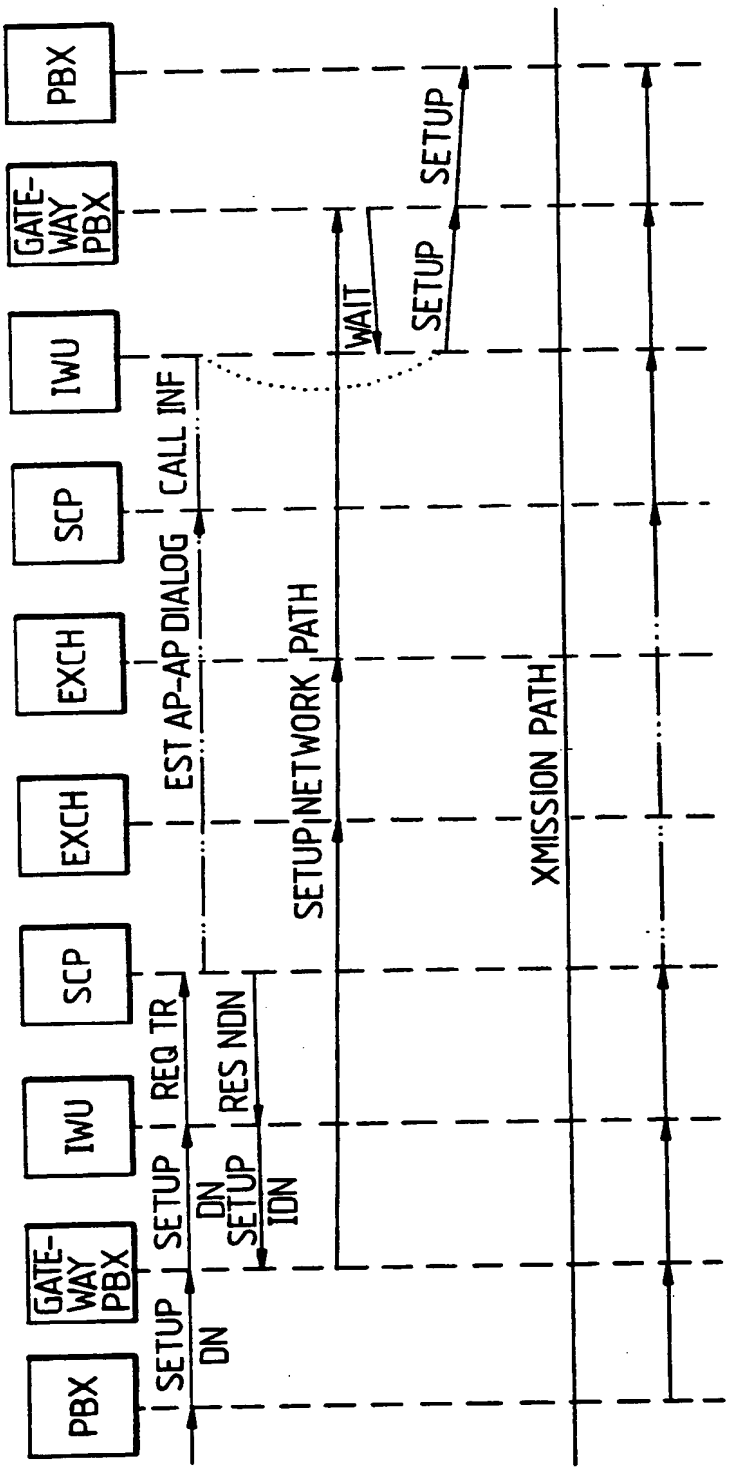
PBX
GATE-WAY PBX
EXCH
EXCH
GATE-WAY PBX
PBX
PBX
PBX

Fig.3.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GATE-WAY PBX
PBX
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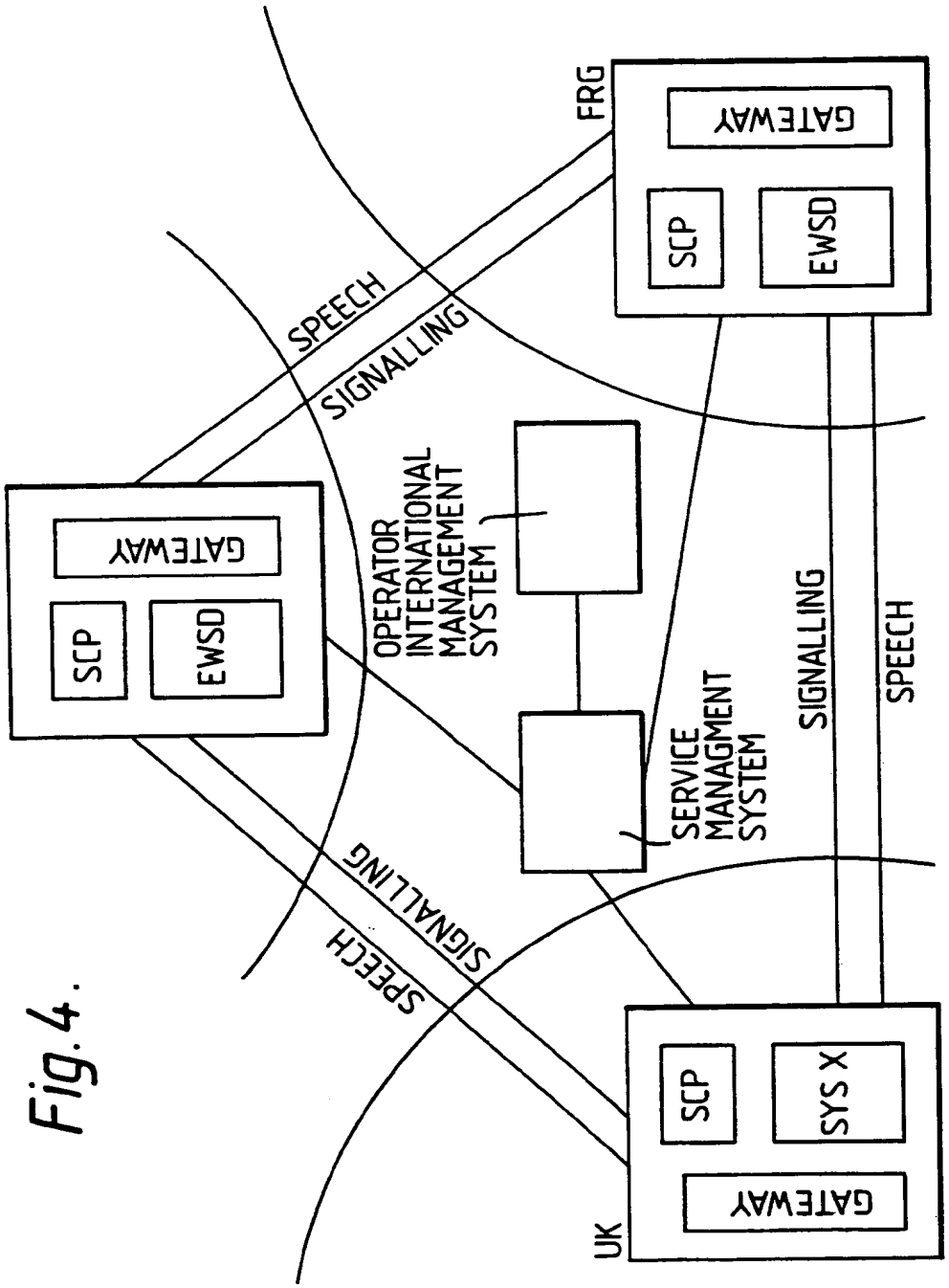
DN
SETUP
DN
REQ TR
RES NDN
SETUP
IDN
EST AP-AP DIALOG
CALL INF
SETUP NETWORK PATH
WAIT
SETUP
SETUP
XMISSION PATH


FRG
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SCP
EWSD
SPEECH
SIGNALLING
USA
GATEWAY
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EWSD
OPERATOR INTERNATIONAL MANAGEMENT SYSTEM
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SPEECH
UK
SCP
SYS X
GATEWAY

Fig. 4.

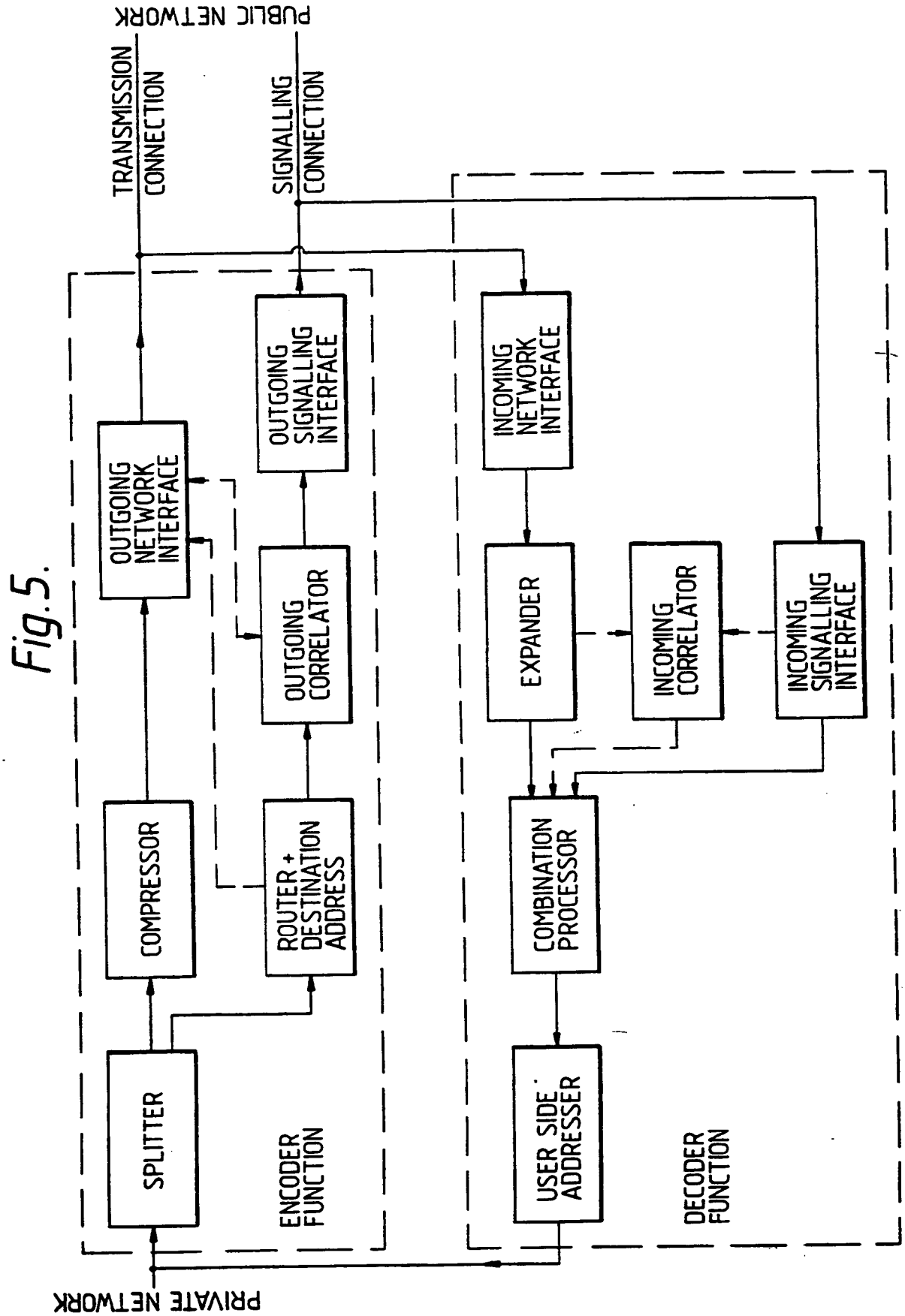
PUBLIC NETWORK
TRANSMISSION CONNECTION
SIGNALLING CONNECTION
OUTGOING NETWORK INTERFACE
OUTGOING SIGNALLING INTERFACE
INCOMING NETWORK INTERFACE
OUTGOING CORRELATOR
EXPANDER
INCOMING CORRELATOR
INCOMING SIGNALLING INTERFACE
COMPRESSOR
ROUTER + DESTINATION ADDRESS
COMBINATION PROCESSOR
SPLITTER
USER SIDE ADDRESSER
ENCODER FUNCTION
DECODER FUNCTION
PRIVATE NETWORK

Fig.5.

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 93/00153

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: H 04 M 7/00, H 04 L 12/46

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	H 04 M, H 04 L, H 04 Q

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	US, A, 4 924 500 (LEWIS et al.) 08 May 1990 (08.05.90), abstract; column 2, line 51 - column 3, line 55; fig. 1,2.	1
A	--	5
A	GB, A, 2 125 252 (STANDARD TELEPHONES AND CABLES) 29 February 1984 (29.02.84), abstract; page 1, lines 3-38; page 1, lines 69-110; fig.	5
A	-- GB, A, 2 174 269 (STC) 29 October 1986 (29.10.86), abstract; fig.	5
A	-- TELEFON REPORT, vol. 13, no. 2, issued June 1977,	5

* Special categories of cited documents: [10]

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
27 April 1993	12 MAY 1993
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	HAJOS e.h.

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages	Relevant to Claim No.
	Siemens Aktiengesellschaft Berlin und München H. JÄGER et al. "Verbindungs-verkehr zwischen Fernsprech--Nebenstellenanlagen - Netzplanung, Numerierung und Übertragungstechnik", pages 55-60 page 55, right-hand column, line 8 - page 56, left-hand column, line 8. ----	

ANHANG

zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

ANNEX

to the International Search Report to the International Patent Application No.

ANNEXE

au rapport de recherche international relatif á la demande de brevet international n°

PCT/GB93/00153 SAE 69446

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The Office is in no way liable for these particulars which are given merely for the purpose of information.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche international visée ci-dessus. Les reseignements fournis sont donnés á titre indicatif et n'engagent pas la responsibilité de l'Office.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US A 4924500	08-05-90	AU A1 53793/90	22-11-90
		AU B2 620240	13-02-92
		CA A1 1312394	05-01-93
		EP A2 398183	22-11-90
		EP A3 398183	23-12-92
		JP A2 2311065	26-12-90
		NO A0 901936	30-04-90
		NO A 901936	19-11-90
GB A 2125252		GB A1 2125252	29-02-84
		GB B2 2125252	29-08-85
GB A 2174269		GB A1 2174269	29-10-86
		GB B2 2174269	07-09-88

Fig.1.

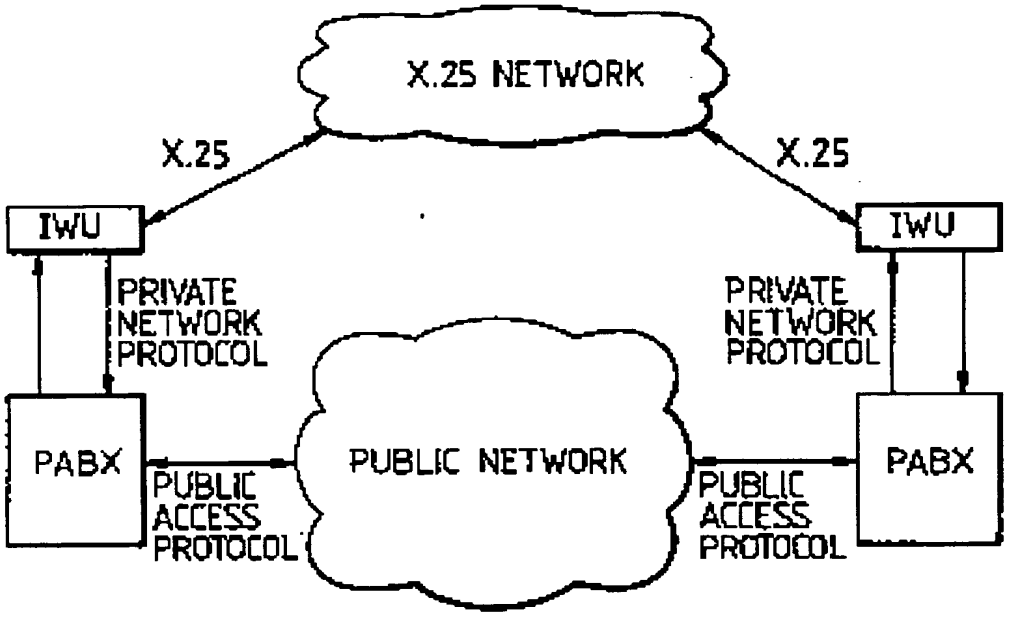
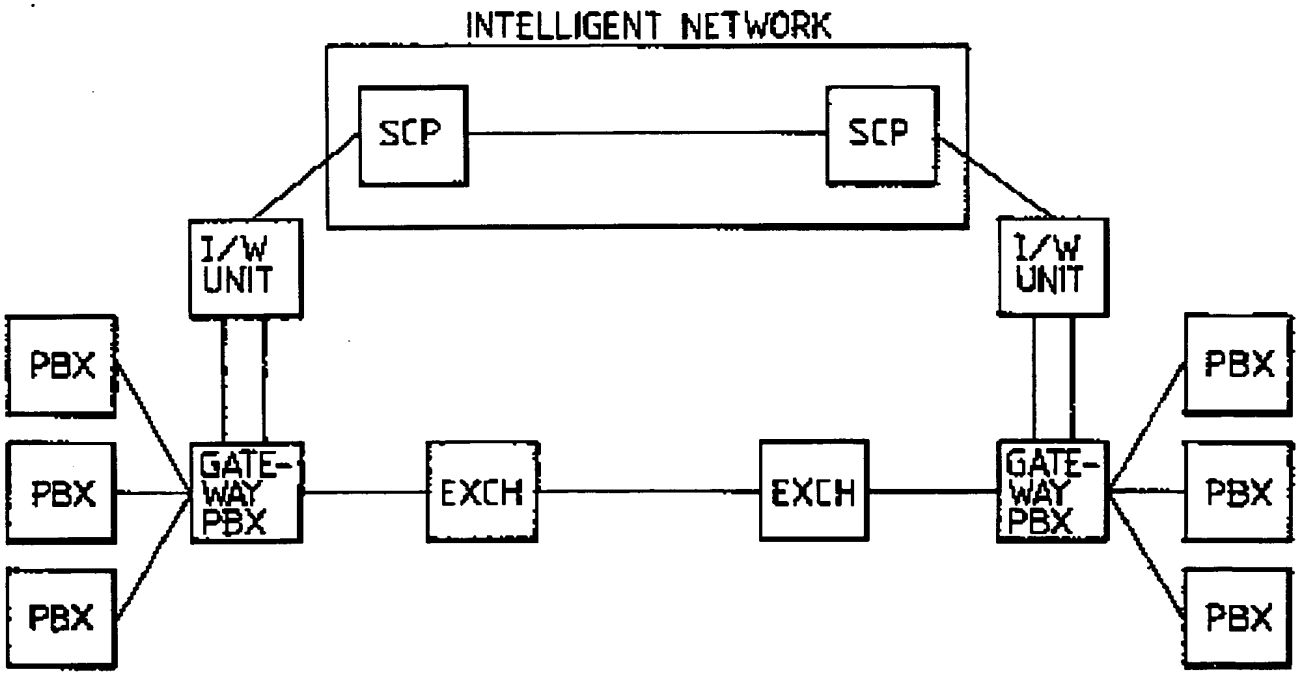
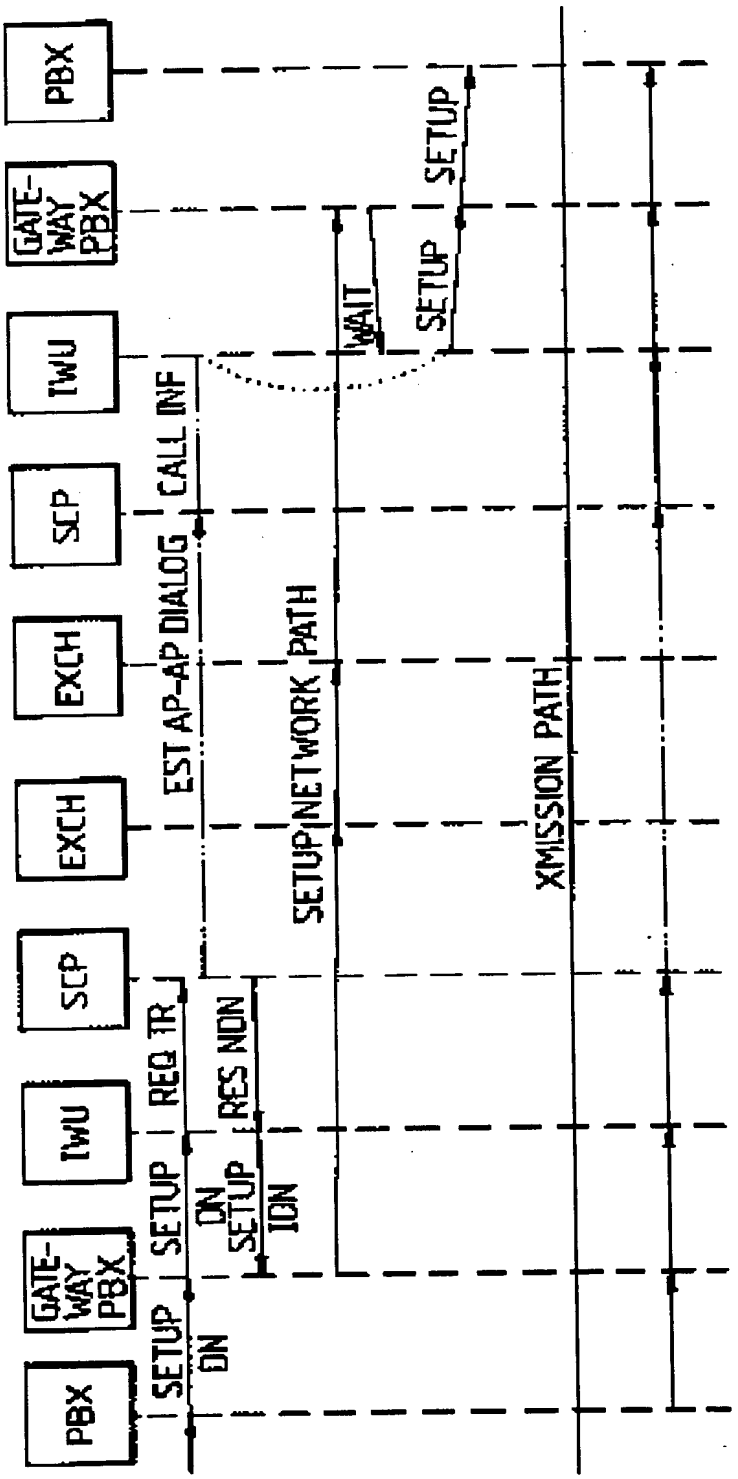


Fig.2.

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PBX
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DN
SETUP
DN
SETUP
IDN
REQ TR
RES NDN
EST AP-AP DIALOG
CALL INF
SETUP NETWORK PATH
WAIT
SETUP
SETUP
XMISSION PATH

Fig.3.

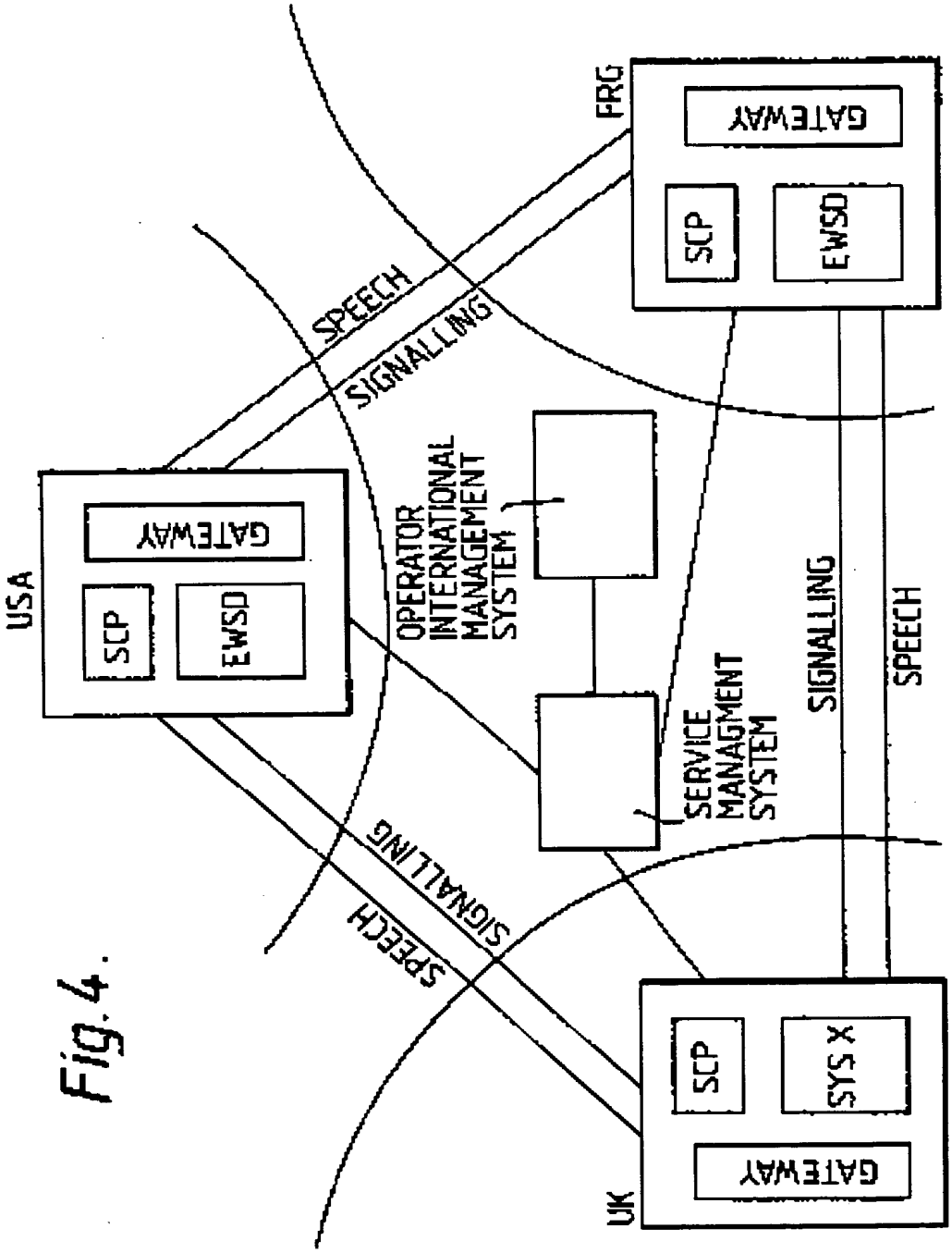
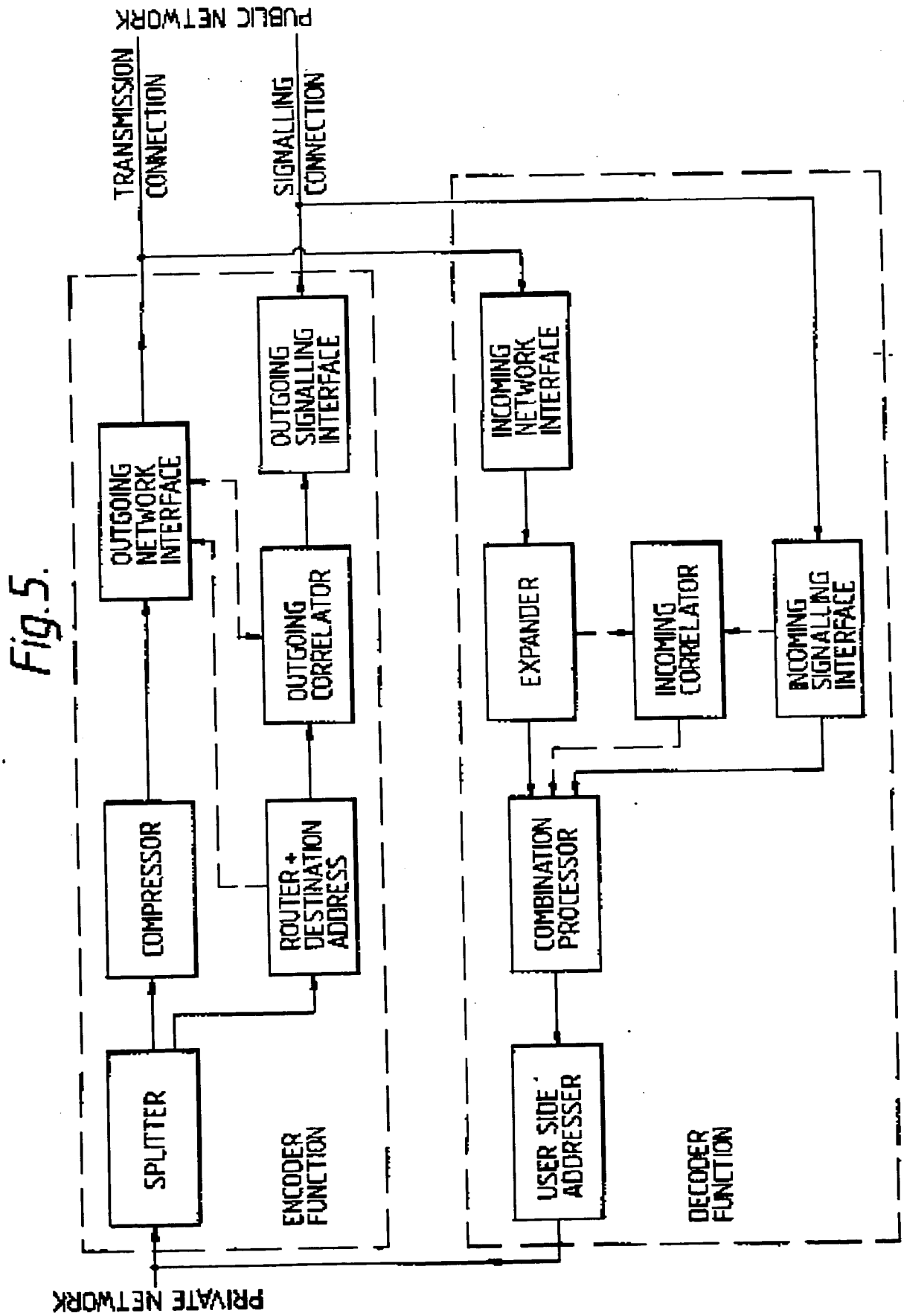


Fig. 4.


PUBLIC NETWORK
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INCOMING NETWORK INTERFACE
OUTGOING CORRELATOR
EXPANDER
INCOMING CORRELATOR
INCOMING SIGNALLING INTERFACE
COMPRESSOR
ROUTER + DESTINATION ADDRESS
COMBINATION PROCESSOR
SPLITTER
USER SIDE ADDRESSER
ENCODER FUNCTION
DECODER FUNCTION
PRIVATE NETWORK

Fig.5.